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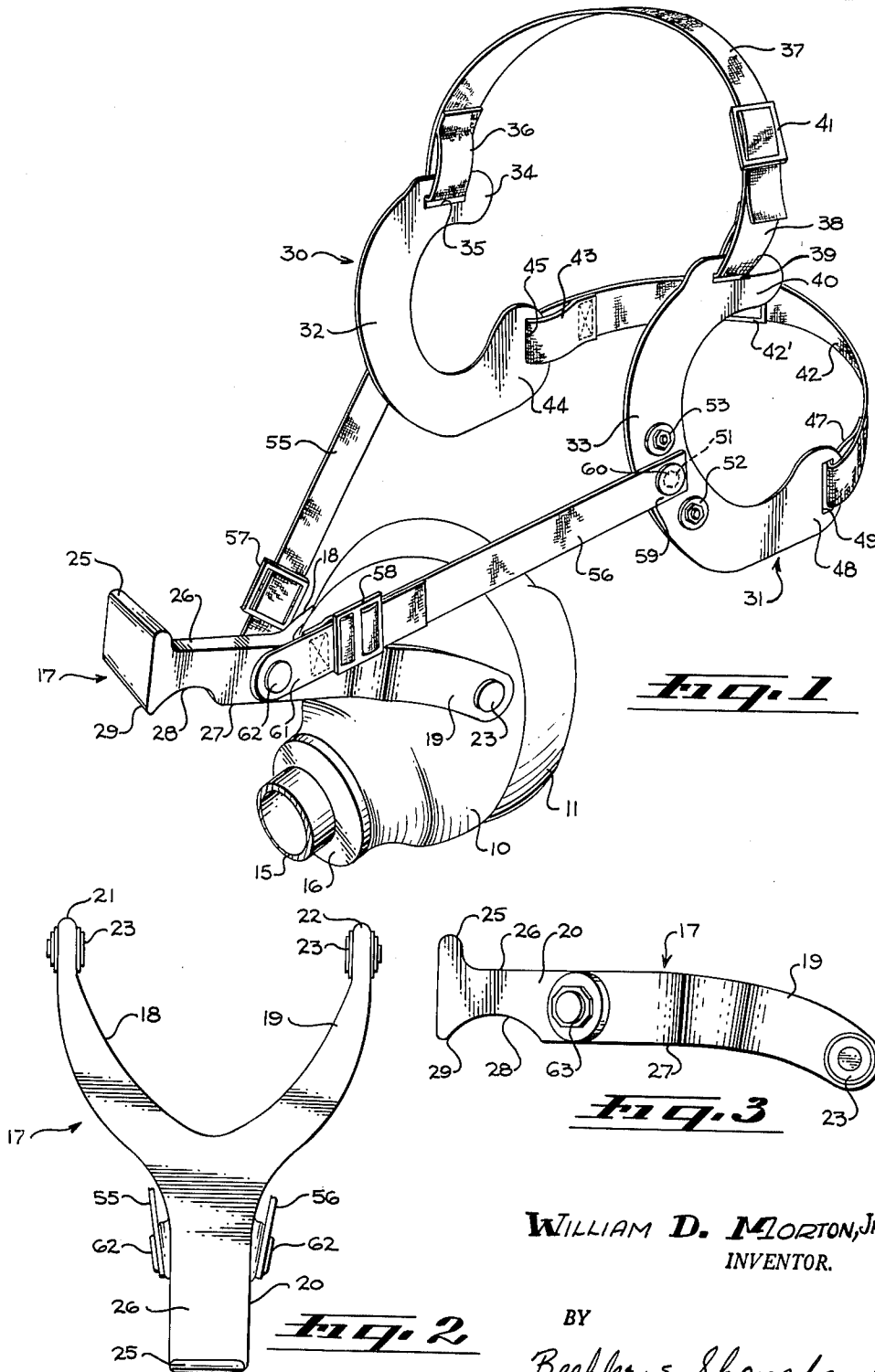
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3,234,939

QUICK-DONNING MASK SUSPENSION

Filed Aug. 26, 1960

2 Sheets-Sheet 1



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Fig. 4

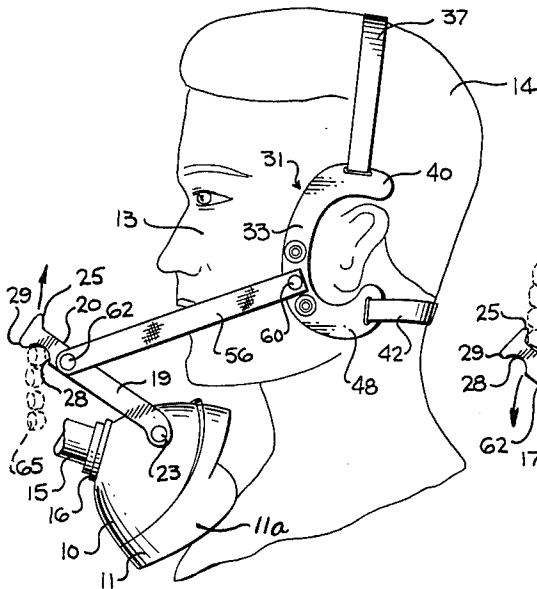


Fig. 5

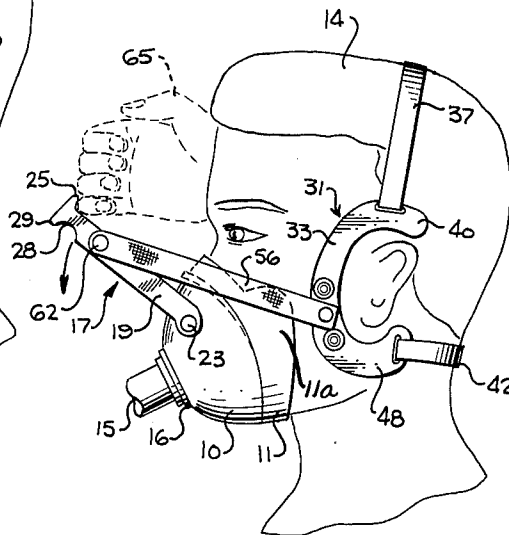
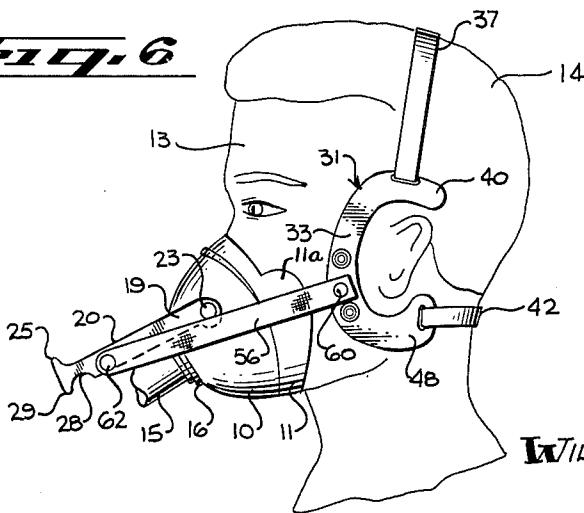


Fig. 6



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QUICK-DONNING MASK SUSPENSION

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2 Claims. (Cl. 128-141)

The invention relates to mask suspensions for oxygen breathing equipment and has particular reference to the suspension for a mask of the type used in high altitude breathing equipment whereby oxygen may be supplied to the wearer by use of a mask receptacle applied over the mouth and nose. The quick-donning suspension here under consideration is more particularly one by means of which the mask can be hung upon the chest of the user suspended from a head harness in a position such that it can be elevated at will to a position on the face when oxygen is needed.

Mask harnesses and mask suspensions have undergone considerable development in recent years due to the requirements of high altitude breathing equipment. It has been widely recognized that because of the prevailing use of pressurized cabins, it is not necessary for the pilot or other officers of an airplane to wear oxygen breathing equipment continuously. Occasions arise, however, when the oxygen mask needs to be applied quickly to the face. Such a condition might comprise an explosive decompression of the interior of the airplane or perhaps arise from the physical condition of the user or for any one of a number of other reasons. Because the user is usually manipulating some control mechanism at the time, it is highly desirable to be able to apply the oxygen mask using only one hand.

Heretofore attempts have been made to construct mask harnesses making this possible, but the structures resorted to for the most part have been somewhat complicated and frequently have not incorporated means by which they can be manipulated quickly enough. Also, in many devices heretofore employed, the parts have been numerous and often of construction so heavy that for long periods of use they become uncomfortable and burdensome on the wearer. This is especially true where the mask harnesses must be worn continuously for reasons of safety hours at a time where the wearer may be under considerable tension in the performance of duties required of him by the job. Under those circumstances even a few ounces weight differential becomes important. Also, as the user becomes slightly fatigued, his reflexes are not as responsive and dependable and accordingly mask-donning harnesses of the kind heretofore employed which require some dexterity and concentration to use become increasingly objectionable and undependable.

Accordingly, it is among the objects of the invention to provide a simple, lightweight, quick-donning mask suspension which is so arranged and constructed that it can be readily swept from a position at rest to a position of use in virtually a single up and down motion of the operator's hand and arm without having to resort to manipulation of the suspension by individual fingers.

Another object of the invention is to provide a new and improved quick-donning mask suspension which is comfortable and easy to wear in a removed position but in a removed position convenient for donning required and which furthermore necessitates substantially a minimum of movement on the part of the user to shift the mask from a position at rest to a position of use.

Still another object of the invention is to provide a new and improved quick-donning mask suspension the operating parts of which are relatively few in number and placed with extremely great convenience to the user such that

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even under conditions of fatigue when the hand of the operator is moved to the general vicinity of the mask the mask can be lifted, placed, and locked in position on the face with a minimum of expenditure of energy and concentration.

Also included among the objects of the invention is to provide a new and improved quick-donning mask suspension and harness therefor which rests comfortably upon the head and neck of the user as well as upon the upper portion of the body with the harness so constructed that ears and most portions of the head are readily exposed permitting the mask to be used effectively without the need for a head covering helmet.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a perspective view of the suspension attached to a breathing receptacle in the relative positions just prior to locking the mask in position on the face.

FIGURE 2 is a plan view of the bar by means of which the receptacle is locked in position with respect to the head harness and the face of the user.

FIGURE 3 is a side elevational view of the bar shown in FIGURE 2.

FIGURE 4 is a side elevational view of the mask suspended by the harness and suspension means in an inoperative position at rest upon the upper portion of the body of the user.

FIGURE 5 is a side elevational view similar to FIGURE 4 showing the mask elevated to a position over the nose and mouth and showing parts in positions immediately prior to being locked on in operative relationship.

FIGURE 6 is a side elevational view similar to FIGURES 4 and 5 showing the mask finally locked in operative position upon the user.

In an embodiment of the invention chosen for the purpose of illustration there is shown a mask or face receptacle 10, often made reference to as a "mask hard-shell" or "facepiece assembly," around the rim of which is a sealing gasket 11 of a rubber-like or plastic cushion by means of which the rim of the receptacle is sealed over its entire perimeter to the contour of the face 13 of a wearer whose head 14 is shown in the position ordinarily assumed during use. A cheek flap 11a forms part of the gasket and overlies the cheek of the wearer on each side. An oxygen supply line 15 of a substantially conventional kind is shown attached by means of a ring 16 to the receptacle at the lower forward portion.

A bar or bar element indicated generally by the reference character 17 is shown in an assembled and operative position in FIGURES 1, 4, 5, and 6 and is shown in some detail in FIGURES 2 and 3. The bar may aptly be described as a Y bar as evidenced by the configuration of FIGURE 2 consisting of arms 18 and 19 joined at their base to a leg 20. A free end 21 of the arm 18 and a free end 22 of the arm 19 is attached to the receptacle 10 by means of a pivoting rivet 23 in each instance. In the normal operative position of the receptacle on the face, it will be noted that the location of the ends 21 and 22 of the respective arms with respect to the receptacle is at the upper forward portion. The rivet is mounted so that the arms may pivot freely with respect to their connection to the receptacle.

At its outer end the leg 20 is provided on the upper portion with a flange 25 extending above an upper face 26 of the bar. On a lower face 27 the bar is provided

with a notch 28 near its forwardmost end leaving a downwardly directed projection 29.

In order to hold the receptacle at all times there is provided a head harness which in the chosen embodiment consists of a pair of earpieces 30 and 31 respectively for the right and left sides of the head of the wearer. Except for the right and left hand relationship the earpieces are substantially the same.

The earpiece 30 is provided with a substantially arcuate midportion 32 adapted to lie forward of the ear, the earpiece 31 being provided with a corresponding midportion 33. At the upper end 34 of the earpiece 32 is a slot 35 in which is secured a loop 36 of a headstrap 37. A loop 38 at the other end of the headstrap is contained in a slot 39. At the upper end 40 of the earpiece 31 there being provided a buckle 41 by means of which the length of the headstrap 37 can be adjusted.

A neck strap 42 provided with a buckle 42' is attached by means of a loop 43 to a lower end 44 of the earpiece 31 passing through a slot 45. At the opposite end a loop 47 is secured to the end 48 of the earpiece 31 through a slot 49.

From an examination of FIGURES 4, 5, and 6 it will be noted that the upper ends 34 and 40 are relatively horizontal although pitched slightly downwardly and rearwardly so that the slots as illustrated by the slot 39 are likewise tilted slightly downwardly toward the rear from horizontal and hence the headstrap 37 is comfortably and securely confined to the midportion of the head 14 of the wearer.

Also as shown in the same figures the lower ends 44 and 48 as illustrated by the location of the end 48, extend slightly rearwardly of the ear and below the ear at a location such that the neckstrap 41 falls comfortably in the nape of the neck.

On the midportions 32 and 33 as revealed particularly by the midportion 33 shown in FIGURES 1, 4, 5, and 6, there are provided swivel fasteners 51, 52, and 53. Although three are shown in the example chosen a greater or lesser number may be employed so long as there is provided a sufficient number to permit the apparatus to be adjusted to wearers having heads of different shape and size. The swivel fasteners are located throughout an area approximately below the midportion of the earpiece in each instance as revealed in FIGURES 4, 5 and 6.

To attach the receptacle to the earpieces there are provided a pair of adjustable connecting straps 55 and 56 provided respectively with buckles 57 and 58. The adjusting straps are similarly attached, hence a description of the adjusting strap 56 will suffice for both. At one end 59 the strap 56 is provided with a fastener 60 which will snap on any one of the swivel fasteners 51, 52, and 53. In the adjustment of the chosen example the fastener 60 is applied to the center fastener 51. At the opposite end 61 of the strap 56 a fastener 62 swivelly secures the end 61 to an appropriate fastener 63 on the leg 20. The attachment at both ends 59 and 61 of the strap 56 is a swivel attachment and hence a pivot point is provided at these locations. Similarly the rivets 23 may be described as providing a pivot point location or pivot points.

When not in use the receptacle 10 is permitted to dangle over the chest of the wearer somewhat as shown in FIGURE 4, below the chin but reasonably close to the chin, mouth and lower face of the wearer. The oxygen supply line 15, a portion only of which is shown, will normally tend to tilt the receptacle in a direction counter-clockwise about the rivets 23 so that the open portion within the gasket 11 will face more or less towards the body of the wearer. The position, in any event, will be a position of comfort both with respect to the location of the receptacle on the upper portion of the body and also with respect to the pull or tension thereby produced carried partially by the earpieces and thence by the headstrap and neckstrap.

When it becomes desirable to position and lock the

mask on the face in operating position the operator can sweep either hand, as for example the right hand 65 as shown in the drawing, upwardly to the position of FIGURE 4. During this movement the uppermost finger will fall into the notch 28 and provide a means for lifting the mask by manipulation of the leg 20. During this portion of the movement the mask is elevated, on occasions being tilted slightly by engagement with the chin of the wearer until the mask, and particularly the opening within the gasket 11, is slightly above the final operating position so that when lifting ceases and the hand is removed the slight weight of the mask will bring it against the face of the wearer, namely to the position illustrated in FIGURE 5. In this position the pivot point identified by the fasteners 62 and 62 will lie above a line extending through the pivot point defined respectively by the rivets 23 and the fasteners 60 and 51. This relationship is readily observable in FIGURE 5.

To lock the receptacle in that position the hand 65 of the wearer is then raised to the position shown in FIGURE 5 where one of the fingers, the little finger for example, falls into position behind the flange 25 and the wearer merely by letting the weight of his hand fall will cause the leg 20 to be pivoted in a counter-clockwise direction about the rivet 23 as shown in FIGURES 5 and 6 until the pivot point defined by the fastener 62 for example overrides the line previously mentioned extending between the rivet 23 and fastener 60. In this position further movement downward of the leg 20 is arrested by engagement of the inner end of the leg at the junction with the arms 18 and 19 against the oxygen supply line 15 or the plate 16 by means of which it is attached to the receptacle, depending upon the specific location of the junction of the leg with the arms. A sufficient flexibility inherent in the gasket 11 as well as in the straps and strap mountings continues to hold the parts in the overridden or locked position of FIGURE 6 as long as desired without undue tension or pressure upon the wearer at any uncomfortable location. The cheek flap in each instance prevents the respective straps 55 and 56 from directly engaging the skin of the wearer.

It is appreciated, of course, that by reason of the presence of the buckles described all of these straps can be adequately and accurately adjusted to the desire of the wearer so that once properly adjusted the quick-donning operation can be quickly and effectively performed. If the pivot point locations are not precisely comfortable for a particular wearer the fasteners 60 for example may be moved upwardly to the fasteners 50 or downwardly to the fasteners 52 as the case may be.

Conversely when it becomes desirable to remove the mask from the position of FIGURE 6 it is necessary only to tilt the leg 20 upwardly from the position of FIGURE 6 to the position of FIGURE 5. This unlocks the mechanism after which the receptacle will fall from the face to the position of FIGURE 4 and can be permitted to hang there until use again becomes necessary.

Having described the invention, what I claim as new and desire to secure by Letters Patent is:

1. A quick donning mask assembly for a breathing mask comprising a mask, a head harness including rigid ear pieces located one adjacent each ear, each ear piece comprising upper and lower ends in vertical alignment, said upper end having in use a location above and in substantial vertical alignment with the ear, said lower end in use having a location below the ear, and a connecting section attached respectively to said upper and lower ends and having in use a location forward of both upper and lower ends and of the ear, a single head strap connecting said upper ends and adapted to extend over the top of the head in substantial alignment with both ears and with said upper and lower ends, and a neck strap connecting said lower ends, a rigid overcenter locking bar having a pivotal connection at one end to the mask, and a single flexible strap on each side in sub-

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stantial fore and aft alignment with a respective end of the neck strap and having a pivotal connection at one end thereof to said connecting section, said flexible strap having a pivotal snap connection at the other end thereof to said locking bar at a location forward of said first identified pivotal connection.

2. A quick donning mask assembly for breathing masks comprising a face mask having an oxygen supply line connected thereto, a head harness comprising a pair of earpieces each adapted to partially surround the upper, forward and lower portions of an ear, each member having upper and lower portions in substantially vertical alignment and a midportion adapted to lie forward of the ear and forward of said upper and lower portions, said midportion interconnecting said upper and lower portions, said upper end portion being adapted to lie above the ear and at a location rearwardly of the forwardmost portion of the ear, said lower end portion being adapted to lie below the ear, said midportion comprising a continuous connection between respectively said upper and lower end portions, a head strap having a junction with said upper end portions, said head strap having a position encircling the head in substantial alignment with both ears and with said upper and lower portions, a neck strap having a junction with said lower end portions, and means alternatively adapted to suspend said mask on the earpieces and to hold said mask to the face comprising a bar element with arms having pivotal connections at ends

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thereof to the mask and with a locking leg extending outwardly from said arms and said mask, and connecting straps on respectively opposite sides of said bar element, a pivotal connection at one end of each strap to the bar element and a pivotal connection on the midportion of each said earpiece for the other end of the respective strap at a location below the junction of the upper end portions and in substantially fore and aft alignment with said neck strap and the junction of said neck strap with the respective lower end portions, said pivotal connections having respective overridden positions wherein the mask is secured to the face by said head harness and said straps.

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